

Distribution of Bed Nets with Malaria Cadres and Socialization on the Use and Maintenance of Insecticide-Treated Nets in the Community of Yongsu Spari Village, Ravenirara District, Jayapura Regency, 2025

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ABSTRACT

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Malaria can be experienced by anyone, from children to adults. The cause of malaria is infection by *Plasmodium* parasites, transmitted through *Anopheles* mosquito bites. Malaria is an environment-based disease. Although many cases of malaria are mild and can resolve on their own, it remains a condition that bothers sufferers and can lead to complications. Therefore, malaria must be addressed as soon as possible. One factor contributing to stunting is recurrent malaria infection. Infectious diseases like malaria, accompanied by diarrhea and vomiting, can cause children to lose fluids and essential nutrients. To prevent stunting, programs are needed to increase public awareness of environmental health. This requires efforts to enhance public knowledge through community empowerment. The method implemented was the provision of malaria prevention cadre training using insecticide-treated nets because the role of malaria cadres is vital in breaking the chain of transmission. The program took place in May 2025 in Ravenirara District, Jayapura Regency. It was attended by 2 malaria cadres. To strengthen their role, education was delivered through counseling, training, and mentoring. Counseling aimed to increase and reinforce cadres' knowledge about malaria, training provided skills in using insecticide-treated nets, and mentoring equipped them to educate the community.

INTRODUCTION

Malaria is an infectious disease caused by the *plasmodium* parasite that attacks red blood cells, and its transmission is through the bite of the *Anopheles* betinda mosquito that has been infected with *Plasmodium* at the gamete stage (World Health Organization, 2023; White et al., 2018). The *Plasmodium* parasite multiplies in the liver before attacking red blood cells, causing a cycle of fever, chills and flu-like illness symptoms (Centers for Disease Control and Prevention, 2022). A cycle of recurrent fever, severe infections can be fatal (Kementerian Kesehatan RI, 2023; Ashley et al., 2018). Malaria is one of the infectious diseases that is still a health problem in the wider community and affects various aspects of the life of the Indonesian nation (Tjitra et al., 2019). This commitment to malaria control is expected to be of concern to all of us, not only nationally, but also regionally and globally as produced at the 60th World Health Assembly (WHA) meeting in 2007 in Geneva on malaria elimination (World Health Organization, 2023; Kementerian Kesehatan RI, 2023).

This commitment to Malaria Elimination is supported by the Minister of Home Affairs through the Circular Letter of the Minister of Home Affairs No.443.41/465/SJ of 2010 concerning the implementation of the malaria program in achieving elimination in Indonesia. The government's commitment is shown in one of the indicators of the 2020-2024 RPJMN (Saputra et al., 2021). One of the strategies in achieving malaria elimination through Early

Diagnosis and Prompt Treatment, namely early detection of malaria cases and appropriate and fast treatment so that transmission can be stopped (Kementerian Kesehatan RI, 2023).

According to the latest World Malaria Report from the World Health Organization (WHO), there will be 263 million cases of malaria in 2023 compared to 252 million cases in 2022. The number of deaths from malaria is estimated to reach 597,000 in 2023 compared to 600,000 in 2022. The African region according to the WHO continues to bear the burden of global malaria is very high. In 2023, the region is home to about 94% of all malaria cases and 95% of deaths. Children under the age of 5 account for about 76% of all malaria deaths in the region. More than half of these deaths occurred in four countries: Nigeria (30.9%), the Democratic Republic of Congo (11.3%), Niger (5.9%) and the United Republic of Tanzania (4.3%) (World Health Organization, 2024).

The trend of Southeast Asian regional malaria cases in 2023 states that Indonesia accounts for one-third of cases in the region; experienced a decrease in cases of 5.7% between 2022–2023 (World Health Organization, 2023; Asia Pacific Malaria Elimination Network, 2023). Malaria endemicity in Papua: about more than 400,000 malaria cases per year, the majority of which are from the Papua region (Kementerian Kesehatan RI, 2022; Tjitra et al., 2019). The 2022 national API: a significant increase, an increase of 62.6% compared to baseline (2014–2022) (World Health Organization, 2022). Positive cases of malaria in 2024 will be 132,260 cases, including 38,148 cases in Jayapura Regency (Kementerian Kesehatan RI, 2024). The Annual Parasite Index (API) at the Ravenirara Health Center in 2021 is 192 per 1,000 population (Dinas Kesehatan Provinsi Papua, 2022). Yongsu Village as a locus of community service is carried out administratively, the government is part of the Ravenirara District (BPS Kabupaten Jayapura, 2023).

The impact of malaria on health is to increase the number of illnesses and deaths, especially in endemic areas such as Papua, NTT, and Maluku. Children and pregnant women are most vulnerable. Lowers the quality of life. Symptoms of malaria (fever, weakness, anemia) can make it difficult for a person to carry out normal activities for days or even weeks. A double burden of disease (co-infection) in remote areas, malaria often occurs at the same time as other diseases such as tuberculosis or malaria.

Social Impact severely disrupts the education of children infected with malaria who often miss school, reducing learning achievement and educational participation. Family productivity is disrupted. If the breadwinner is sick, the family's income decreases; If the child is sick, the parents (especially the mother) must stop working to take care of them. Stigma and fear, people can feel afraid to travel to endemic areas; immigrants are reluctant to live or work there.

Economic Impact Malaria causes high medical and treatment costs. Although malaria treatment is covered by BPJS, the cost of transportation, hospitalization, and lost wages is not small. Another thing is that malaria can reduce labor productivity. Farmers, fishermen, and daily laborers cannot work when they are struck by malaria, especially during the harvest period. Hindering regional development, endemic areas (e.g., the interior of Papua) often experience development delays because the workforce is disrupted and investors are reluctant to enter.

The burden on the country's economy, the government allocates large funds for the provision of medicines, mosquito nets, vaccines, surveillance, and prevention campaigns. Impact on the Environment and Infrastructure, forming a "vicious circle of endemism". Poor

sanitation, waterlogging, and settlements without mosquito nets can increase the risk of malaria transmission, limited access to services in endemic areas, health facilities are often difficult to reach, delayed diagnosis to an increase in severe cases. A real example in Papua contributes to malaria cases of >80% of national cases, greatly affecting the development and welfare of local communities. NTT and Maluku, malaria disease is often an obstacle in the tourism and agricultural sectors. Border areas: Often face logistical difficulties in malaria prevention and treatment.

Malaria Disease Prevention Method with Long Lasting Insecticide Nets (LLIN). Long-lasting insecticide mosquito nets (LLIN) are one of the main malaria prevention strategies recommended by the WHO and the Indonesian Ministry of Health. A Long Lasting Insecticide Net (LLIN) mosquito net is a mosquito net that has been impregnated with an insecticide (usually pyrethroid) that effectively kills mosquitoes in direct contact. It lasts up to 3–5 years or about 20–30 washes. No need to dip/re-soak with insecticides (unlike regular ITNs). The purpose of the use of KBTL/LLIN is to protect individuals while sleeping (Anopheles mosquitoes are active at night), reduce the population of infectious mosquitoes (because mosquitoes die after contact with mosquito nets), and break the chain of malaria transmission in the community.

The Correct Way to Use LLIN is: 1) Install the mosquito net over the bed so that it covers the entire side. 2) Use it every night, especially during a night's sleep. 3) Make sure the mosquito net is not torn, hollowed, or opened. 4) Do not wash too often, it is enough if it is completely dirty (ideal: <3x per year). 5) Wash by hand, without bleach and hot water, then dry in the shade (not directly in the sun). 6) Keep away from fire and overheating as LLIN is flammable.

Educating the public about the use and treatment of KBTL/LLIN is very important to provide education on the benefits of using KBTL/LLIN in preventing malaria, how to install and treat, encourage collective use (all household members) and make LLIN a daily habit, not just assistance from government programs. The effectiveness of KBTL/LLIN According to WHO, LLIN can reduce 50–60% of malaria infections in communities, child mortality by up to 20% in endemic areas. The effect is maximum when the coverage of use is >80% of households in a region. The distribution of LLIN in Indonesia is carried out by the Indonesian Ministry of Health through the malaria elimination program. Priority malaria distribution in high endemic areas such as Papua, West Papua, NTT, and Maluku. It is usually distributed for free once every 3 years.

The priority problem of partners in community service activities in Yingsu Village, Ravenirara District, Jayapura Regency is the low knowledge, attitude, and skills of malaria cadres and the community in the use and care of Long-Lasting Insecticide Mosquito Nets (KBTL/LLIN) as an effort to prevent and control malaria. Therefore, this activity aims to increase cadres' knowledge about malaria and KBTL/LLIN, improve cadres' skills in using and caring for KBTL/LLIN correctly, and stimulate the initiative of cadres and the community to independently use and repair damaged or torn KBTL/LLIN.

This activity is expected to provide benefits to the community through increasing the role and capacity of village malaria cadres, supporting local health centers in malaria control programs towards malaria elimination by 2030 in accordance with the policies of the Ministry of Health of the Republic of Indonesia, and contributing to educational institutions in the

implementation of the Tridarma of Higher Education, enrichment of teaching materials, and strengthening practical learning in the field for students in overcoming endemic malaria diseases in Papua.

METHOD

The method used in this activity is applied research with a community service approach, which is carried out through the stages of counseling, training, and demonstration. The program began with the preparation stage in the form of a needs survey and interviews with district heads, heads of health centers, and malaria cadres in Ravenirara District, followed by the preparation of tools and materials in the form of the preparation of malaria counseling and training modules and the use of insecticide mosquito nets. The implementation stage includes licensing correspondence, coordination with the health center, district head, and Yongsu village head, preparation and production of modules, implementation of malaria cadre counseling and training, and cadre assistance in conducting counseling to the community.

The evaluation was carried out through observation of demonstrations of the use of insecticide mosquito nets by cadres and knowledge improvement assessments using pre-test and post-test. The activity partners consist of the health center, district heads, the community, and malaria cadres who play an active role according to their respective duties. This activity will be held at the Ravenirara District Meeting Hall in May 2025 with the support of the PKM team who have expertise in the field of material design, counseling modeling, and learning evaluation.

RESULT AND DISCUSSION

This community service activity will be carried out in May 2025 in Yongsu Spari Village, Ravenirara District, Jayapura Regency, by involving two malaria cadres as the main participants of the training. Activities include counseling, training, and assistance in the use and maintenance of Long-Lasting Insecticide Mosquito Nets (KBTL/LLIN).

Characteristics of Activity Participants

The participants of the activity are active malaria cadres who have been involved in the malaria control program in the work area of the Ravenirara Health Center. All cadres are domiciled in Yongsu Spari Village and have basic experience in public health promotive and preventive activities.

Increasing Cadre Knowledge about Malaria and KBTL/LLIN

The evaluation of increasing cadre knowledge is carried out through pre-tests and post-tests which contain questions related to the definition of malaria, how it is transmitted, the benefits of using KBTL/LLIN, and how to maintain mosquito nets correctly. The results of the evaluation showed an increase in cadre knowledge after being given counseling and training.

Table 1. Average Knowledge Score of Malaria Cadres Before and After Training

Assessment Variables	Pre-test	Post-test
Malaria Knowledge	55	85
KBTL/LLIN Knowledge	50	90

Source: Primary data, 2025

The increase in knowledge scores showed that counseling and training materials could be well received by malaria cadres.

Improving Cadre Skills in the Use and Maintenance of KBTL/LLIN

Cadre skills were evaluated through direct observation during the KBTL/LLIN installation and maintenance demonstration. The results of the observation showed that all cadres were able to install mosquito nets correctly, ensure that mosquito nets covered all sides of the bed, and explain how to care for mosquito nets to the community. Cadres were also able to explain the proper washing frequency, how to wash without damaging insecticides, and the importance of using mosquito nets every night as an effort to prevent malaria.

Implementation of Mentoring and Education to the Community

At the mentoring stage, malaria cadres were accompanied by a service team to conduct direct education to the people of Yongsu Spari Village. This activity includes the delivery of information about the dangers of malaria, the benefits of using KBTL/LLIN, and simulations of installing mosquito nets in residents' homes. The community showed a positive response and active participation during the activity.

The results of this community service activity show that the counseling, training, and mentoring approach is effective in increasing the capacity of malaria cadres in Yongsu Spari Village. Increasing the knowledge and skills of cadres is an important factor in strengthening community-based malaria prevention efforts in high-endemic areas such as Papua.

The increase in cadre knowledge score after the intervention showed that the counseling method accompanied by educational media and interactive discussions was able to increase cadres' understanding of malaria and the use of KBTL/LLIN. Good knowledge is the main basis for cadres to play a role as agents of change in society, especially in educating families and the surrounding environment about malaria prevention.

In addition to knowledge, improving the skills of cadres in the use and maintenance of KBTL/LLIN is also an important finding. The ability of cadres to demonstrate the installation of mosquito nets and explain the correct way of maintenance shows that practical training has a real impact on the readiness of cadres in carrying out their roles. This is important because the misuse or care of mosquito nets can reduce the effectiveness of KBTL/LLIN in preventing Anopheles mosquito bites.

Cadre assistance in educating the community strengthens the community empowerment process. The direct involvement of cadres in counseling at the household level encourages the formation of the habit of using mosquito nets regularly and sustainably. This approach is in accordance with the socio-cultural conditions of the people of Yongsu Spari Village who are more receptive to information from known local figures or cadres.

The advantage of this service activity is the participatory approach that involves cadres from the planning stage to implementation, thereby increasing cadres' sense of ownership and responsibility towards the malaria control program. However, the limitations of this activity are the limited number of cadres and the relatively short mentoring time, so follow-up and continuous support from the health center and local government are needed.

Overall, the results of the activity show that the empowerment of malaria cadres through training and assistance in the use of KBTL/LLIN is a relevant and contextual strategy to reduce the risk of malaria transmission in endemic areas, and has the potential to be applied to similar communities with similar environmental and social characteristics.

CONCLUSION

Community service activities involving counseling, training, and assistance for malaria cadres in Yongsu Spari Village, Ravenirara District, Jayapura Regency, successfully enhanced cadres' knowledge and skills in preventing malaria via the proper use and maintenance of Long-Lasting Insecticide Mosquito Nets (KBTL/LLIN), as evidenced by pre- and post-test results and their demonstrated proficiency in net installation. These community empowerment methods aligned well with local needs in malaria-endemic areas, addressing low public understanding and fostering cadre-led health education that boosted acceptance and regular net usage for behavioral change. The efforts strengthened cadre roles, supported Ravenirara Health Center's malaria control, and advanced elimination goals, despite challenges like limited cadre numbers and short assistance duration. For future research, longitudinal studies could evaluate the long-term impact of scaled-up cadre programs on malaria incidence rates and sustained community adherence in similar remote settings.

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